

**Problem statement** A rational number is a quotient of two integers. Thus,  $\frac{27}{894}$  is a rational number, and so is  $\frac{17}{44} + \frac{90}{2,103} - \frac{1}{337}$  (“simplification” is *not* necessary in this problem – sums, products, etc. of rational numbers *are* rational numbers).

a) Find a rational number that is within  $10^{-100}$  of  $\sin(.4)$ .

b) Find a rational number that is within  $10^{-100}$  of  $\sin(1.4)$ .

c) Find a rational number that is within  $10^{-100}$  of  $e^{2.8}$ .

**Comment** You are *not* asked to exhibit, for example, the decimal approximation implied. You are only asked to show the rational numbers requested and give reasons why your approximations are correct. There are many possible correct answers to this problem.